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(54) **Methods for forming sealing gaskets for containers.**

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Description

It is standard practice to provide a sealing gasket on the inner surface of a closure for a container so as to improve the seal between the closure and the container. The gasket is usually formed by applying fluid composition to the closure and then solidifying the composition. Many of the compositions are applied as solutions or plastisols but these can incur the disadvantage that it is necessary to cure the material in the fluid and this in turn generally requires heating of the closure. This necessitates the provision of suitable ovens or other heating apparatus and if the closure is of a heat sensitive material, for example a thermoplastics, the heating may result in serious distortion of the cap.

It is known that, in theory, gaskets can be formed from molten thermoplastics composition merely by allowing the composition to cool and solidify against the inner surface of the closure. The thermoplastics composition can be introduced in solid form and then heated (with the disadvantages discussed above) or can be introduced as a melt and solidified onto the closure.

Although melt application is very desirable for some purposes, e.g. for lining plastics caps, the sealing properties of the resultant gaskets tend to be unsatisfactory, especially when the contents of the container are to be pressurised and the closure is a screw closure. For instance a pressure-tight seal may not be obtainable or may be obtainable only under such a high loading on the closure that it is impossible to remove the screw closure by hand.

In British Patent Specification GB—A—1092161 various compositions are proposed containing from 16 to 92 parts by weight of specified ethylene vinyl acetate copolymer and 5 to 75 parts by weight of a specified compatible resin. The amount of resin is, in the examples, always between about 15 and about 50% by weight of the total composition. In example 6 it is stated that long skirt tin plate crowns retain pressure in excess of 12 bar (kg/cm^2). However such crowns would not be removed by screwing and so the pressure retention can be achieved simply by increasing the loading on the closure during closing. In example 7 removal torques of 0.6 to 2.3 Nm (6 to 23 cm kg) were obtained for screw plastic and metal caps but in this example the container is not pressurised and when it contains soft drinks it is stated that the drinks are non-carbonated.

This is consistent with our experience, which is that it is not possible, using existing thermoplastics melt compositions, to obtain good pressure tightness at an acceptably low removal torque.

In European Patent Publication 0031673 a hot melt adhesive is used for forming a sealing gasket and is applied in foamed form. The foaming is said to result in the gasket having greater resiliency and requiring less material for its formation. However it incurs the disadvantages that it necessitates the provision of material to foam the melt and we find that foamed systems only give adequate pressure-tight seals at unacceptably high removal torque values.

In the invention a sealing gasket is formed on the inner surface of a closure for a container and that is a screw closure or a roll-on cap by applying to the surface an unfoamed molten composition comprising thermoplastics material and spinning the closure while the composition is molten, and the composition comprises

55 to 99% by weight thermoplastic polymeric material comprising ethylene vinyl acetate copolymer optionally blended with polyalkylene and having a melt index 30 or above 30,

0 to 30% of a wax,

plasticising resin in an amount of 8 to 20% when the melt index of the polymeric material is 30—99 and in an amount of 0 to 20% when the melt index is above 100, and

0.1 to 10% slip aid (all percentages being by weight based on the weight of fusible organic components in the composition)

and the composition has a viscosity at 172°C measured at a shear rate of 237/s of from 5 to 40 Pa . s (50 to 400 poise) and when applied as a melt to a closure to form a standard gasket provides a gasket that has a venting pressure of at least 10.5 bar (kg/cm^2) and that has a removal torque of from 0.65 to 1.95 Nm (6.5 to 19.5 cm kg).

The composition is preferably applied at a temperature close to 172°C (e.g., within 30%) on to a closure that is spinning at 300 to 8,000 r/min. The amounts and conditions are preferably such that the gasket that is formed has a venting pressure and a removal torque having the values defined above.

The percentages quoted herein for the amounts of components of the composition are all, unless otherwise stated, expressed as percentages by weight based on the weight of fusible organic components in the composition.

The composition generally consists only of fusible organic components but if desired may include non-fusible organic or inorganic materials such as titanium dioxide, china clay or other inorganic pigments or fillers. If titanium dioxide is present its total amount is normally below 10% and most usually below 5%, for instance 0.5 to 3% by weight. Other materials may be used in place of some or all of the titanium dioxide in quantities such that the total amount of non-fusable organic and inorganic material is normally below 20%, usually below 10% and preferably below 5%.

If slip aid is included in plastisol compositions the normal amount that is added is around 1% since it is accepted that very small amounts are sufficient to give optimum attainable properties and that there is no advantage in increasing the amount. In Specification No 1092161 the amounts of slip aid used in the examples range between about 8% and 18%. In the invention we never use more than 10% and generally the amount of slip aid is 1 to 5%.

We have surprisingly found that increasing the amount of slip aid by quite a small amount above the low amount that would normally be regarded as adequate gives a dramatic improvement in venting pressure and removal torque properties. The precise amount will depend upon the particular type of slip aid and upon the other components of the composition. It should therefore be determined by formulating a composition free of slip aid and then testing the effect of varying amounts of slip aid in that composition. This testing can be conducted over a narrow range of slip aid amounts, generally 0.2 to 3 or at the most 5%. The variations in properties within this range are far in excess of the routine variations that one would normally expect if the amount of slip aid is varied above, say 1%.

The reason for this great sensitivity, and the reason for obtaining such good venting pressure and removal torque values upon optimising the amount of slip aid at a low level is not clear but may be associated with the fact that the composition does consist of a large amount of thermoplastic polymeric material (or thermoplastic material plus wax) and is free of solvents, liquid plasticisers and other diluents and generally contains, at most, quite a low amount of plasticising resin.

The composition should have a viscosity within the defined range since outside these values it is difficult to form, by melt application, a gasket having the desired properties. It is generally preferred that the viscosity, measured at 172°C at a shear rate of 237 s^{-1}, should be below 30 Pa · s (300) and preferably below 20 Pa · s (200 poise). This facilitates the application of the melt composition onto the screw closure. It is also generally preferred that the viscosity should be at least 9 Pa · s (90 poise), and preferably at least 10 Pa · s (100 poise), since these higher viscosities seem to be associated with improved venting pressure and removal torque values. Preferably the viscosity is between 11 to 18 Pa · s (110 to 180 poise), most preferably 12 to 17 Pa · s (120 to 170 poise) with best results generally being obtained at values of 13 to 16 Pa · s (130 to 160 poise).

The venting pressure and removal torque values are determined on a standard gasket. This is a gasket obtained by extruding the composition at 175°C through a nozzle onto the inner surface of a 28 mm diameter polypropylene screw cap. If an annular gasket is required, the nozzle directs the composition to one side of the cap while the cap is spinning at about 3,500 r/min. The gasket weight is then 200—250 mg. If an overall gasket is required the nozzle directs the composition to the centre of the cap while the cap is rotating at about 5500 r/min. The gasket weight is then 350—400 mg.

Venting pressure is recorded using the Owens-Illinois Secure Seal Tester. A polyethylene terephthalate bottle neck is fitted by a pressure-tight fixing to a bottle base in the Tester, so as to form a bottle. The lined cap is screwed onto the test bottle by a conventional capping machine set at a head load of approximately 400 Newtons (40 kg) and a closing torque of 1—1.5 Nm (10—15 cm kg).

A compressed air line leads to a needle fitted in the bottle base so as to permit compressed air to be forced into the bottle. The bottle, including the screw cap, is immersed in water and the water is observed, as the pressure in the bottle is increased, for the escape of air from the cap. Air pressure is gradually increased stepwise at a controlled rate. The pressure is released 10 seconds after 14 bar (kg/cm²) has been reached. If venting from the cap is observed the test is halted and the pressure recorded. If no venting has been recorded by 14 bar (kg/cm²) the cap is recorded as having a venting pressure of 14+ bar (kg/cm²).

After the venting pressure test has been finished the plastic bottle top, with the cap attached, is removed and is clamped in a Kork-a-Torque tester with which the torque required to remove the cap from the bottle is measured.

The process of the invention can produce a standard gasket having a venting pressure of at least 10.5 bar (150 psi) and generally at least 12 bar (kg/cm²). The preferred process can provide a gasket having a venting pressure of 14+ bar (200+ psi). The process can provide a gasket which has a removal torque of at least 6.5 cm kg (6 inch lbs, 0.6 Nm) and generally at least 0.75 Nm (7.5 cm kg). The removal torque preferably is less than 1.5 Nm (15.5 cm kg 14 inch lbs) and generally is less than 1.4 Nm (14 cm kg), and preferably less than 1.3 Nm (13 cm kg). Best results are obtained when the removal torque is from 0.8 to 1.1 Nm (8 to 11 cm kg).

Preferably at least 60% and generally at least 70%, of the composition is provided by thermoplastic polymeric material, since it seems that the presence of large amounts of other organic materials, for instance large amounts of fusible tackifying resin as in GB—A—1092161, prevent the attainment of the defined physical properties. It is often preferred that the amount of thermoplastic polymeric material is 60 to 85%.

The molecular weight of the thermoplastic material or materials and their chemical constitution must be selected such that the composition has the desired viscosity, and is not so low that the material should be defined as a wax.

It is often preferred that the ethylene vinyl acetate copolymer (which may be a blend of such copolymers) should have a melt index of above 350 and generally above 450, most preferably 500 to 600. This indicates a low molecular weight. It is then preferred for the amount of plasticising resin to be from 0 to 8%, preferably 0%. However good results can also be obtained with lower melt indices. For instance satisfactory compositions can be made when the melt index of the thermoplastic material is above 100, especially if the composition contains 15 to 30% wax and 0 to 8%, preferably 0%, plasticising resin. If the melt index of the thermoplastic is below 100, for instance 30 to 99, it will generally be desirable to include plasticising resin, for instance in an amount of 8 to 20%, often 12 to 18%.

As mentioned the composition may contain a wax or waxes, for example polyethylene wax, paraffin wax or microcrystalline wax. The amount is generally below 30%, for instance 15 to 27%. Suitable polyethylene wax, especially for blending with ethylene vinyl acetate copolymer, has a viscosity at 171°C and 237 s^{-1} shear rate of less than 5 Pa · s (50 poise), generally less than 4 Pa · s (40) poise) and typically between 0.05 and 2 Pa · s (0.5 and 20 poise). The polyethylene wax may be mixed with a higher molecular weight polyethylene which would generally have a melt index of greater than 100, typically 200—500. The amount of polyethylene in the blend with the ethylene vinyl acetate copolymer is generally 5 to 40%, preferably 10 to 30% and most preferably 12 to 20%.

The ethylene vinyl acetate in the blend may have quite a low vinyl acetate content in order to ensure that the two polymers are fully compatible in the composition. The amount of vinyl acetate may be below 30% and is often below 25%, for instance 10 to 19%.

Instead of producing a physical blend of polyethylene and ethylene vinyl acetate it is also possible to achieve the same results by forming a block copolymer of ethylene vinyl acetate and polyethylene.

Suitable plasticising resins that may be included in small amounts include hydroabietyl alcohol, terpene resin, glycerol ester of wood rosin-maleic anhydride adduct, hydrogenated, disproportionated or polymerised wood rosin, polyhydric alcohol esters of abietic acid or of hydrogenated wood rosin.

The polyhydric alcohol ester is usually a glycerol, ethylene glycol, diethylene glycol, or pentaerythritol ester. The pentaerythritol ester of hydrogenated wood rosin (often called merely "rosin" instead of "wood rosin") can for example be the stabilised form available as Hercules Resin Pentalyn® H. The polyhydric alcohol esters of abietic acid can conveniently be employed in the form of esterified wood rosin, since wood rosin contains a large proportion of abietic acid. Derivatives of wood rosin, i.e. hydrogenated, disproportioned or polymerised wood rosin, can also be used as the resin component. Preferred examples of the resin component are the glycerol ester of abietic acid, the ethylene glycol ester of abietic acid, and the diethylene glycol ester of abietic acid, particularly the glycerol ester of abietic acid.

The molecular weight of the resin is generally from 300 to 3000. Often the total amount of plasticising resin is below 5%.

The slip aid may be a conventional silicone slip aid, a hydrogenated castor oil wax or a fatty amide, for instance an aliphatic amide in which the aliphatic group contains 10 to 30, preferably 14 to 25, carbon atoms, for instance being stearamide or oleamide. Preferably it is a blend of silicone oil and fatty amide, for instance in the proportions by weight 1:0.5 to 1:2.

The composition may include inorganic pigment or filler, as mentioned above, and may include other minor components for example, antioxidants. The total amount of such other minor components is generally below 10%, preferably below 5%, by weight of the organic components of the composition.

The compositions are of particular value when the cap is of polypropylene or other plastics material but they are also useful for aluminium or other metal caps. The caps may be conventional screw-on caps or they may be roll-on caps.

The gaskets are of particular value for sealing pressurized containers that are not heated, for instance for carbonated soft drinks. However the gaskets can also be used in non-pressurised containers and can be used in containers that are filled hot or pasteurised. Naturally the temperature or other conditions of filling or pasteurisation must not be such as to damage the gasket.

The most important and valuable use of the compositions is for melt application to a plastics cap to form a gasket for pressurised container, preferably for a carbonated beverage, the cap preferably being a screw-on cap.

The following are examples of the invention.

Example 1

85 parts of ethylene vinyl acetate copolymer having a melt index of 530 and containing 19% vinyl acetate is blended with 15 parts of polyethylene wax having a melt viscosity of 1.65 poise (0.16 Pa · s) at 237/s shear rate and 171°C, 1 part of titanium dioxide 1 part silicone slip aid and 0.2 parts thermal stabiliser. The silicon slip aid is a 60,000 mm^2/s (cSt) polysiloxane. The components are blended in a suitable mixer and are extruded, without addition of foaming gas, through a Nordson Foam Melt apparatus at a temperature of 175°C. The composition has a viscosity of 15.2 Pa · s (152 poise) at 171°C and 237/s shear rate. The molten composition is extruded into nominal 28 mm polypropylene screw caps which are spun at 6,000 r/min. The deposited film weight, per cap, is 402 mg. Upon testing, as above, venting pressures between 2.1 and 5.3 bar (kg/cm^2) and removal torques of 1.65 and 1.2 Nm (16.5 and 12 cm kg) are recorded. Accordingly this composition is unsatisfactory.

When the composition is reformulated using 2 parts of the slip aid, instead of 1, venting pressures of 10.5, 14+ and 14+ bar (kg/cm^2) and removal torques of 1.21, 1.32 and 1.43 Nm (12.1, 13.2 and 14.3 cm kg) are recorded. Accordingly this composition is satisfactory.

Example 2

The process of Example 1 is repeated except that the amount of ethylene vinyl acetate is reduced to 80 parts and the amount of polyethylene wax is increased to 15.9 parts and 4.05 parts of polyethylene with a melt index of 250 is included. The viscosity at 171°C and 237/s is 15.9 Pa · s (159 poise). The film weight is 411 mg. Venting pressures of 14+ and 14 bar (kg/cm^2) and removal torques of 1.54 and 1.32 Nm (15.4 and 13.2 cm kg) are recorded.

When this is repeated using 2 parts silicon slip aid, instead of 1 part and a film weight of 365 mg venting pressures of 14+ bar (kg/cm²) are consistently recorded and the removal torque varies between 1.32 and 1.43 Nm (13.2 and 14.3 cm kg).

When the process is repeated using 1 part silicone slip aid and 0.6 parts oleamide slip aid and a coating weight of 354 mg, the venting pressure is consistently recorded as 14+ bar (kg/cm²) and the removal torque as 0.78 Nm (7.8 cm kg).

Example 3

A process is conducted as in Example 1 except that a composition is prepared from 70 parts ethylene vinyl acetate, 30 parts polyethylene wax, 1 part oleamide and 1 part thermal stabiliser and is deposited to form a gasket of 341 mg. The venting pressure is 14+ bar (kg/cm²) and the removal torque 0.78 Nm (7.8 cm kg).

Example 4

A process is conducted as in Example 1 except that the composition is formed of 74 parts of an ethylene vinyl acetate copolymer blend having a melt flow index of 126.5 and formed of equal parts of copolymers of melt index 40 and 400, 26 parts microcrystalline wax, 1 part titanium dioxide, 1 part silicone oil, 1 part fatty amide and 0.3 parts thermal stabiliser. The viscosity of the composition at 171°C and 237/s is 15 Pa · s (150 poise). Upon lining as in Example 1 the film weight is 262 mg, the venting pressure 14+ bar (kg/cm²) and removal torque 1.39 Nm (13.9 cm kg).

Example 5

A process is conducted as in Example 1 except that the composition is formed from 74 parts of an ethylene vinyl acetate copolymer blend having a melt flow index of 126.5 and formed of 21 parts copolymer melt index 7 and 53 parts copolymer melt index 400, 26 parts microcrystalline wax, 1 part titanium dioxide, 1 part silicone oil, 1 part fatty amide and 0.2 parts thermal stabiliser. The viscosity of the composition at 171°C and 237/s is 15.5 Pa · s (155 poise). Upon lining as in Example 1 the film weight is 237 mg, the venting pressure 14+ bar (kg/cm²) and removal torque 1.27 Nm (12.7 cm kg).

Example 6

A process is conducted as in Example 1 except that the composition is formed of 60 parts ethylene vinyl acetate copolymer having a melt index 40, 5 parts petroleum jelly (Vaseline, trade mark), 15 parts pentaerythritol rosin ester plasticising resin, 5 parts microcrystalline wax, 15 parts high melting point paraffin wax, 1 part titanium dioxide, and 0.5 parts thermal stabiliser. The viscosity at 171°C and 237/s is 15.3 Pa · s (153 poise). Upon lining as in Example 1 the film weight is 253 mg, the venting pressure 14+ bar (kg/cm²) and removal torque 1.6 Nm (16.0 cm kg).

Claims

1. A method of forming a sealing gasket on the inner surface of a closure for a container, which closure is a screw closure or roll-on cap, by applying to the surface an unfoamed molten composition comprising thermoplastics material and spinning the closure while the composition is molten characterised in that the composition comprises

55 to 99% by weight thermoplastic polymeric material comprising ethylene vinyl acetate copolymer optionally blended with polyalkylene and having a melt index 30 or above 30,

0 to 30% of a wax,

plasticising resin in an amount of 8 to 20% when the melt index of the polymeric material is 30—99 and in an amount of 0 to 20% when the melt index is above 100, and

0.1 to 10% slip aid (all percentages being by weight based on the weight of fusible organic components in the composition)

and the composition has a viscosity at 172°C measured at a shear rate of 237/s of from 5 to 40 Pa · s (50 to 400 poise) and when applied as a melt to a closure to form a standard gasket provides a gasket that has a venting pressure of at least 10.5 bar (kg/cm²) and that has a removal torque of from 0.65 to 1.95 Nm (6.5 to 19.5 cm kg).

2. A method according to claim 1 in which the molten composition is applied to the cap while the cap is spinning at 300 to 8000 r/min.

3. A method according to either preceding claim in which the amount of thermoplastic polymeric material is from 70 to 99% and the amount of plasticising resin is 0 to 8%.

4. A method according to any preceding claim in which the composition has a viscosity of from 11 to 18 Pa · s (110 to 180 poise).

5. A method according to any preceding claim in which the thermoplastic polymeric material has a melt index of above 350.

6. A method according to any of claims 1 to 4 in which the thermoplastic polymeric material has a melt index of above 100 and the composition contains from 15 to 30% wax and 0 to 8% plasticising resin.

7. A method according to claim 5 or claim 6 in which the composition contains 0% plasticising resin.

8. A method according to any preceding claim in which the thermoplastic polymeric material consists of ethylene vinyl acetate copolymer or a blend of such copolymers.

9. A method according to any preceding claim in which the amount of thermoplastic polymeric material is from 60 to 85% and the amount of wax is from 15 to 27%.

10. A method according to any preceding claim in which the amount of slip aid is 1 to 5%.

11. A method according to any preceding claim in which the slip aid comprises a silicone, a fatty amide or blend thereof.

12. A method according to any preceding claim in which the gasket has a removal torque of 0.75

to 1.4 Nm (7.5 to 14 cm kg) and a venting pressure of at least 12 bar (kg/cm^2).

13. A method according to any preceding claim in which the closure is a plastics screw-on cap or a plastics roll-on cap.

14. A closure, or a pressurised container sealed by a closure in which the closure is a plastics screw-on cap or plastics roll-on cap and the closure carries a gasket characterized in that the gasket has been formed by a method according to any of claims 1 to 13.

Patentansprüche

1. Verfahren zur Herstellung einer Dichtung auf der inneren Oberfläche eines Verschlusses für einen Behälter, wobei der Verschluß ein Schraubverschluß oder ein Aufrollverschluß ist, durch Auftragen einer ungeschäumten, geschmolzenen, thermoplastisches Material enthaltenden Zusammensetzung auf die Oberfläche und Rotieren des Verschlusses während die Zusammensetzung geschmolzen ist, dadurch gekennzeichnet, daß die Zusammensetzung 55 bis 99 Gew.% thermoplastisches polymeres Material mit einem Schmelzindex von 30 oder über 30, welches Ethylen-Vinylacetat-Copolymer, gegebenenfalls mit Polyalkylen vermischt, umfaßt, 0 bis 30 Gew.% Wachs, weichmachendes Harz in einer Menge von 8 bis 20 Gew.%, wenn der Schmelzindex des polymeren Materials 30 bis 99 beträgt, und in einer Menge von 0 bis 20 Gew.%, wenn der Schmelzindex größer als 100 ist, und 0,1 bis 10 Gew.% Gleitmittel (alle Prozentangaben sind Gewichtsprozent bezogen auf das Gewicht der schmelzbaren organischen Komponenten in der Zusammensetzung) enthält und die Zusammensetzung bei 172°C eine bei einer Schergeschwindigkeit von 237/s gemessene Viskosität von 5 bis 40 Pa · s (50 bis 400 Poise) aufweist und einen Verschluß mit einem Entlüftungsdruck von zumindest 10,5 bar und einem Entfernungsdrehmoment von 0,65 bis 1,95 Nm liefert, wenn sie als Schmelze auf einen Verschluß aufgetragen wird, um eine Standarddichtung zu bilden.

2. Verfahren nach Anspruch 1, in dem die geschmolzene Zusammensetzung auf den Verschluß aufgetragen wird, während der Verschluß mit 300 bis 8000 Umdrehungen pro Minute rotiert.

3. Verfahren nach einem der vorangehenden Ansprüche, in dem die Menge des thermoplastischen polymeren Materials 70 bis 99 Gew.% und die Menge des weichmachenden Harzes 0 bis 8 Gew.% beträgt.

4. Verfahren nach einem der vorangehenden Ansprüche, in dem die Zusammensetzung eine Viskosität von 11 bis 18 Pa · s (110 bis 180 Poise) aufweist.

5. Verfahren nach einem der vorangehenden Ansprüche in dem das thermoplastische polymere Material einen Schmelzindex von über 350 aufweist.

6. Verfahren nach einem der Ansprüche 1 bis 4, in dem das thermoplastische polymere Material einen Schmelzindex von über 100 aufweist und die Zusammensetzung 15 bis 30 Gew.% Wachs und 0 bis 8 Gew.% weichmachendes Harz enthält.

7. Verfahren nach Anspruch 5 oder 6, in dem Zusammensetzung 0% weichmachendes Harz enthält.

8. Verfahren nach einem der vorangehenden Ansprüche, in dem das thermoplastische polymere Material aus Ethylen-Vinylacetat-Copolymer oder einer Mischung derartiger Copolymere besteht.

9. Verfahren nach einem der vorangehenden Ansprüche, in dem die Menge des thermoplastischen polymeren Materials 60 bis 85 Gew.% und die Menge des Wachses 15 bis 27 Gew.% beträgt.

10. Verfahren nach einem der vorangehenden Ansprüche, in dem die Menge des Gleitmittels 1 bis 5 Gew.% beträgt.

11. Verfahren nach einem der vorangehenden Ansprüche, in dem das Gleitmittel ein Silikon, ein Fettsäureamid oder eine Mischung davon umfaßt.

12. Verfahren nach einem der vorangehenden Ansprüche, in dem die Dichtung ein Entfernungsdrehmoment von 0,75 bis 1,4 Nm und einen Entlüftungsdruck von zumindest 12 bar aufweist.

13. Verfahren nach einem der vorangehenden Ansprüche, in dem der Verschluß ein Kunststoffaufschraubverschluß oder ein Kunststoffaufrollverschluß ist.

14. Verschluß oder ein durch einen Verschluß verschlossener unter Druck stehender Behälter, wobei der Verschluß ein Kunststoffaufschraubverschluß oder ein Kunststoffaufrollverschluß ist und der Verschluß eine Dichtung tägt, dadurch gekennzeichnet, daß die Dichtung durch ein Verfahren nach einem der Ansprüche 1 bis 13 gebildet worden ist.

Revendications

1. Procédé pour la fabrication d'une garniture der fermeture sur la surface interne d'une fermeture d'un récipient, laquelle fermeture est une fermeture à vis ou un capuchon à tourner, par application, à la surface, d'une composition fondue et ne moussant pas, comprenant une matière thermoplastique, et centrifugation de la fermeture lorsque la composition est fondue, caractérisé en ce que la composition comprend

55 à 99% en poids d'une matière polymérique thermoplastique comprenant un copolymère d'éthylène-acétate de vinyle facultativement mélangé à un polyalkylène et ayant un indice de fusion de 30 ou au delà de 30,

0 à 30% d'une cire,

une résine de plastification en une quantité de 8 à 20% lorsque l'indice de fusion de la matière polymérique est de 30—99 et une quantité de 0 à 20% lorsque l'indice de fusion est au delà de 100, et

0,1 à 10% d'auxiliaire de glissement (tous les pourcentages étant en poids, en se basant sur le poids des composants organiques fusibles dans la composition)

et la composition a une viscosité à 172°C mesurée à un taux de cisaillement de 237/s, de 5 à 40 Pa · s (50 à 400 poises) et lorsqu'elle est appliquée sous la forme d'un produit fondu à une fermeture pour former une garniture standard, produire une garniture qui a une pression d'évent d'au moins 10,5 bars (kg/cm^2) et qui a un couple d'enlèvement de 0,65 à 1,95 Nm (6,5 à 19,5 cm kg).

2. Procédé selon la revendication 1 où la composition fondue est appliquée au capuchon alors que le capuchon tourne entre 300 et 800 t/mn.

3. Procédé selon l'une quelconque des revendications précédentes où la quantité de la matière polymérique thermoplastique est comprise entre 70 et 99% et la quantité de la résine plastifiante est de 0 à 8%.

4. Procédé selon l'une quelconque des revendications précédentes où la composition a une viscosité de 11 à 18 Pa · s (110 à 180 poises).

5. Procédé selon l'une quelconque des revendications précédentes où la matière polymérique thermoplastique a un indice de fusion au delà de 350.

6. Procédé selon l'une quelconque des revendications 1 à 4 où la matière polymérique thermoplastique a un indice de fusion au delà de 100 et la composition contient de 15 à 30% de cire et 0 à 8% d'une résine plastifiante.

7. Procédé selon la revendication 5 ou la revendication 6 où la composition contient 0% de résine plastifiante.

8. Procédé selon l'une quelconque des revendications précédentes où la matière polymérique thermoplastique consiste en un copolymère d'éthylène-acétate de vinyle ou un mélange de tels copolymères.

9. Procédé selon l'une quelconque des revendications précédentes où la quantité de la matière polymérique thermoplastique est comprise entre 60 et 85% et la quantité de cire est comprise entre 15 et 27%.

10. Procédé selon l'une quelconque des revendications précédentes où la quantité de l'auxiliaire de glissement est de 1 à 5%.

11. Procédé selon l'une quelconque des revendications précédentes où l'auxiliaire de glissement comprend une silicone, un amide gras ou leur mélange.

12. Procédé selon l'une quelconque des revendications précédentes où la garniture a un couple d'enlèvement de 0,75 à 1,4 Nm (7,5 à 14 cm kg) et une pression d'évent d'au moins 12 bar (kg/cm^2).

13. Procédé selon l'une quelconque des revendications précédentes où la fermeture est un capuchon à visser en plastique ou un capuchon à tourner en plastique.

14. Fermeture, ou récipient sous pression scellé par une fermeture, où la fermeture est un capuchon à visser en plastique ou un capuchon à tourner en plastique et la fermeture porte une garniture, caractérisée en ce que la garniture a été formée par un procédé selon l'une quelconque des revendications 1 à 13.